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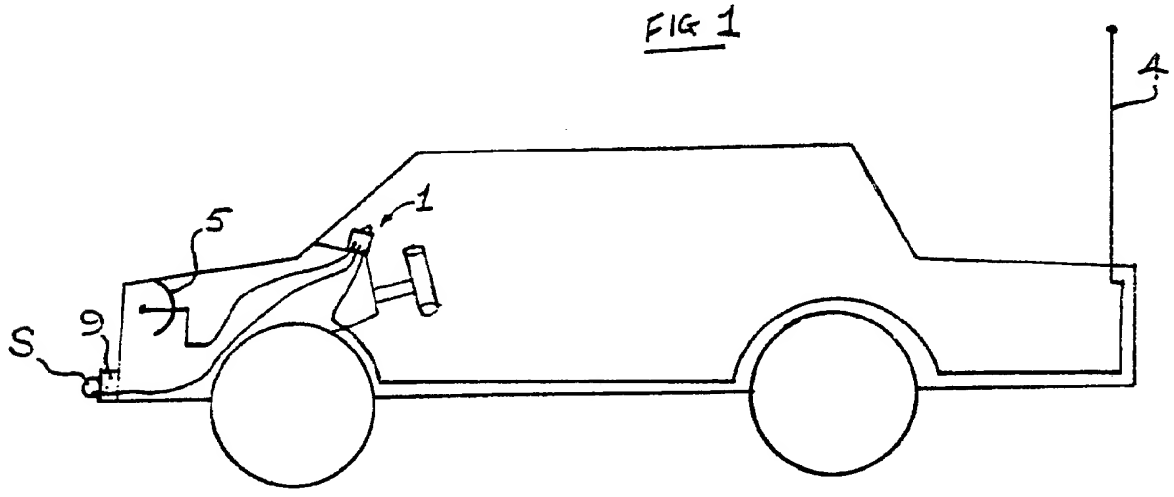
(54) Crash warning system.

(57) A crash warning system for motor vehicles is described, wherein each vehicle is equipped with a transmitter (T) activated by a crash sensor (S, I), preferably an inertia switch, to emit a signal when the vehicle is in collision, and a receiver (R) capable of detecting signals emitted from other vehicles to warn the driver of the existence of a collision in the vicinity. Preferably the signal is a radio signal, and directional receiving antennae (5) ensure that only receivers (R) in vehicles approaching the crash site are activated. The unit may be permanently installed in the vehicle, or may be portable for use in one of a plurality of vehicles by a driver.

FIG 1



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CRASH WARNING SYSTEM

The present invention relates to warning systems, and is particularly concerned with providing a warning system to alert motorists approaching traffic hazards.

Motorway traffic is notorious for its apparent disregard for conditions of poor visibility, in that drivers do not seem to reduce their speed sufficiently in fog or in rain when visibility is limited. This is the cause of many accidents, with damage and loss of life being compounded by vehicles colliding with the wreckage already on the carriageway.

The present invention seeks to provide a system whereby a vehicle involved in a collision automatically sends a warning signal receivable by following traffic, warning drivers to slow down and stop.

According to the present invention, a vehicle crash warning system comprises a transmitter unit linked to a crash sensor and a receiver unit capable of receiving signals from the transmitter, an alarm being activated by the receiver when a signal is received.

Preferably the transmitter unit is a relatively short range radio transmitter, and the crash sensor may be a conventional inertia switching device operable on an abrupt acceleration or impact. Alternatively, the crash sensor may be a switching device linked to the vehicle's bumper to detect deformation of the bumper, or movement of the bumper relative to the vehicle body. As a further alternative, a flexible fluid-filled tube may be attached to the vehicle's bumper bars, with a fluid-pressure operated switch to register impacts on the bumper bars.

The receiver unit is preferably a radio receiver tuned to the transmitter frequency, and advantageously includes circuitry to discriminate between a transmitter which is approaching the receiver and one which is receding therefrom, and to operate the alarm only when a transmitting transmitter is being approached.

In a most preferred arrangement, a directional antenna is provided for the receiver so that only signals emanating from sources in front of the vehicle are registered. Preferably an arc of about 90° either side of the vehicle's centreline is covered by the receiver antenna. The antenna for the transmitter part of the device is preferably omnidirectional, so that effective warning signals are transmitted from crashed vehicles irrespective of the direction in which the crashed vehicles face once stopped.

A preferred embodiment of the system will now be described in detail. With reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a crash warning unit installed in a vehicle; and

Figure 2 is a schematic diagram of the crash warning unit to a larger scale .

Referring now to Figure 1, the installation comprises a crash warning unit 1 mounted for example to the vehicle's fascia. The unit 1 houses a transmitter T, an inertia switch I sensitive to abrupt acceleration or deceleration of the vehicle in any direction, and a receiver unit R linked to an audible alarm 2 and a visual alarm 3 situated in the driver's compartment of the vehicle. The power source for the transmitter, the receiver, and the alarm devices may be the vehicle's electrical system, or an independent source such as a battery may be provided. The independent source may be a battery rechargeable from the vehicle's own system.

The receiver unit is preferably housed in the same enclosure as the transmitter, and has external connections to a transmitting aerial 4 and a receiving aerial 5. The receiver R may include circuitry to discriminate between approaching and receding sources of transmission. This may be done either by sampling the signal strength at discrete intervals and comparing the strengths of successive signal samples, the alarm 2 being sounded if signal strength is found to be increasing, or by using a Doppler shift in the frequency of the transmission to discriminate between approaching and receding sources. It is implicit that the transmitters T of all the units in a system will be tuned to a predetermined frequency, thus making Doppler shift usable as a discriminating characteristic. Alternately, the radio signal from the transmitter T may be emitted as a train of discrete pulses at a set interval, and the shift of interval in the pulses will indicate an approaching source.

In use, the system may be permanently installed in a vehicle and wired to the vehicle's electricity supply P. When the vehicle is involved in a rapid deceleration such as in a crash, the radio transmitter T will be actuated by the inertia switch I and will commence transmission on the warning frequency, via the omnidirectional aerial 4.

The inertia switch I may be of conventional construction, and maybe identical to switches currently installed in fuel injected vehicles to cut off power to the fuel pump in the event of a crash. In such vehicles, use may be made of the existing inertia switch to control the transmitter T of a crash warning unit.

Vehicles approaching the crash site fitted with like warning units will pick up the warning radio signal via the aerial 5, and the receiver will activate

the alarm devices 2 and 3, alerting the driver to the approaching hazard. The range of the radio warning signal may be adjusted by controlling the power output of the transmitter T and/or by providing the receiver R with a threshold control so that only signals above a predetermined strength are considered.

Clearly, vehicles immediately 'downstream' of the crash site will receive the radio signal and their alarm devices will not be operated since the receiver will detect a receding radio source.

The receiver circuitry can be simplified by omitting the discriminator circuits, if the aerial 5 of the receiver R is arranged to be a directional antenna 5 oriented to receive only signals emanating from a source in front of the receiving vehicle. In such an arrangement, vehicles 'downstream' of a crash site will not have their alarms activated since the signal sources will not be within the arc of detection of their receiving antennae 5.

To prevent oncoming traffic on an unobstructed carriageway of a motorway from receiving spurious warning signals emanating from crashed vehicles on the other carriageway, different frequencies could be provided, for example Northbound drivers using a first frequency and Southbound drivers being assigned a second frequency. By providing selector controls 10 on the transmitter T and receiver R for the driver, the appropriate transmission and reception frequency could be selected for each part of a journey as the driver negotiates the motorway network.

As an alternative to the receiver R discriminating between approaching and receding vehicles, the transmitter T may be made directional so that signals are emitted only rearwardly from the vehicle. Thus, only following vehicles would be alerted but difficulty might be encountered if a crash occurs on or after a bend in the road, or if a crashed vehicle slews round so as to lie across the road.

As an alternative to the inertia switch I, the transmitter T may be activated by a switch S mounted on the vehicle body to detect impact. Such a switch may be closed by a deformation of the vehicle bumper 9, or may comprise a deformable tube filled with fluid and provided with a pressure operated switch to activate the tansmitter on impact.

In order that vehicles fitted with the crash warning system may afford a warning to nearby vehicles not so fitted, a connection 6 to the vehicle's lighting circuit 7 may be made, so that the fitted vehicle's lights could be flashed to provide a visual indication that a crash site is being approached. Preferably the brake lights would be operated, since operation of the hazard lights when in motion is dangerous in that it prevents direction signals from being given.

As an alternative to permanent fixing in a vehicle, it is envisaged that a self-contained portable warning unit may be provided. Such a unit comprises a preferably fireproof and impact resistant enclosure containing the transmitter, receiver, crash sensor, power source and alarm devices and provided externally with controls for activating the unit (on/off switch), battery test indicator, and frequency selector if appropriate.

Such a unit could be carried by the driver and attached, for example by suction cups or adhesive pads, to a convenient point in the vehicle, to be activated when the vehicle is involved in a crash. The power for the unit could alternatively be supplied from the vehicle's supply P, e.g. via the cigar lighter socket.

Both the portable and the permanently installed system may include a manual override switch 8, enabling the motorist to activate the transmitter even when no impact has occurred with his vehicle.

In the case of the portable or permanently installed device, a timer may be included so that the duration of transmission of the warning signal is limited to a set time, for example five minutes. This will avoid overloading an area with radio transmissions which might interfere with communications by emergency services.

To provide an indication of the urgency of a warning given by the system, the alarm device such as a lamp or a horn may be operated proportionately to the strength of the received signal, so that for example the alarm sound increases in loundness as the crash site is approached.

It is further envisaged that the emergency services could monitor the frequency of transmission of the units, in order that the earliest possible arrival of police and ambulance services at the crash scene.

Claims

1. A crash warning system for motor vehicles, comprising a plurality of units (1) for mounting in respective vehicles, each unit comprising a transmitter (T) activated by a crash sensor (S, I) for sending a warning signal, and a receiver (R) capable of activating an alarm (2, 3) in the driving compartment on receipt of said warning signal.

2. A crash warning system according to Claim 1, wherein the warning signal is a radio signal transmitted at a predetermined frequency, and the receiver (R) is a radio receiver tuned to that frequency.

3. A crash warning system according to Claim 1

or Claim 2, wherein the crash sensor is an inertia switch (T) operated by an acceleration or deceleration of the vehicle associated with an impact.

4. A crash warning system according to Claim 1 or Claim 2, wherein the crash sensor (S) is activated by a deformation of the vehicle structure.

5. A crash warning system according to Claim 1 or Claim 2, wherein the crash sensor is a pressure switch operated by fluid contained in a deformable reservoir.

6. A crash warning system according to any of Claims 2 to 5, wherein each unit (1) has a transmitter antenna (4) capable of transmitting warning signals in all directions, and a directional receiver antenna (5) capable of receiving signals from a region ahead of the vehicle only.

7. A crash warning system according to Claims 2 to 6, wherein the transmission frequency of the radio warning signal and the tuning frequency of the receiver may be selected from a plurality of preset frequencies.

8. A crash warning system according to Claim 2, wherein the receiver includes circuitry to sample the strength of a received signal at discrete intervals and to compare the strengths of successive samples, and circuitry to trigger the alarm if the signal strength of the latest sample exceeds that of the previous sample.

9. A crash warning system according to any preceding Claim, wherein the alarm activated by the receiver comprises an audible alarm (2).

10. A crash warning system according to Claim 9, wherein the receiver includes circuitry to detect the strength of the warning signal received, the output of the alarm being increased as the warning signal strength increases.

11. A crash warning system according to any preceding Claim, wherein the receiver not only activates the alarm in receipt of a warning signal, but also activates an external warning device (7) mounted on the vehicle.

12. A crash warning system according to Claim 11, wherein the external warning device (7) is the vehicle's brake lights.

13. A crash warning unit (1) for mounting to a vehicle, comprising a crash sensor (S, I) coupled to a transmitter (T) and a power source (P) so as to activate the transmitter (T) to emit a warning signal when a crash is sensed, and a receiver (R) capable of receiving such a warning signal and coupled to an alarm to activate the alarm (2, 3) when a warning signal is detected.

14. A crash warning unit according to Claim 13, wherein the crash sensor is an inertia switch (I) operated by abrupt acceleration, and the transmitter (T) and receiver (R) are a radio transmitter and receiver operating on the same frequency.

15. A crash warning unit according to Claim 14, wherein the operating frequency can be selected from a plurality of preset frequencies.

16. A crash warning unit according to Claim 14, wherein a transmission antenna (4) is associated with the transmitter to provide omnidirectional transmission of warning signals, and a directional antenna (5) is associated with the receiver to detect signals emanating from within a predetermined arc relative to the unit (1), the unit being mountable in the vehicle to detect signals emanating from a region in front of the vehicle.

Fig 1.

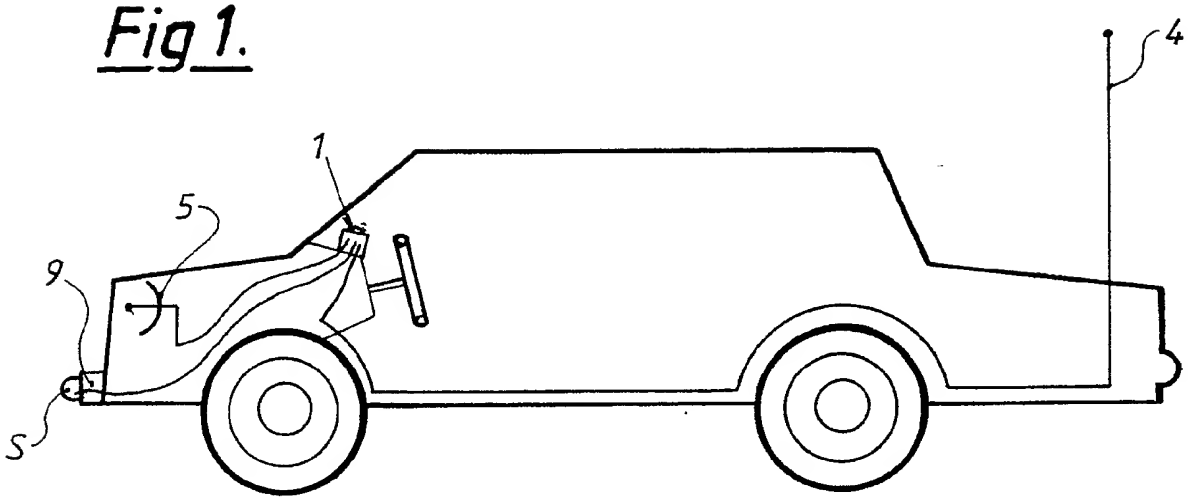

Fig 2.